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Neckeraceae.—U. DAMMER (Notizblatt König. Bot. Gart. 4:171-173. 1905) describes a new genus (*Kinetostigma*) of Guatemalan palms.—E. JANCZEWSKI (Bull. Acad. Sci. Cracovie, pp. 13. Jan. 1906), in his second paper on Ribes, presents the species of the subgenera Ribesia and Coreosma, including new Californian and Mexican species.—A. BORZI (Notarisia 21:14-16. 1906) describes a new genus (*Zoddaea*) of Chlorophyceae (Chroolepidaceae) from a Mediterranean island.

**Heredity.**—A lecture on heredity and the origin of species by MACDOUGAL<sup>12</sup> not only presents the author's views regarding the several more prominent evolution hypotheses, but also makes the first public announcement of important results of his own researches on the causes of mutation.

While not denying the possibility of other means of production of species, he holds that hybridization and mutation are the only *demonstrated* methods by which new species have arisen. He attributes a popular belief in the Neo-Lamarckian hypothesis to the supposed effects of garden practice, and these supposed effects are supposed to be due to the prevalence of vicinism and the vegetative propagation of bud-sports. Several "unsurmountable objections" are opposed to the Neo-Darwinian hypothesis of natural selection of slight variations as a universal method. He would distinguish orthogenesis from determinate variations, limiting the former to an internal perfecting force which evolves rudimentary organs and develops them to functional structures without any reference to selection; while the latter he would allow as a part of every method of evolutionary procedure, in that no structure may vary to any other structure too much unlike itself. This is a very important discrimination theoretically, but it is clear that in most cases a practical distinction between orthogenesis and determinate variation as here defined would be an impossibility, since the "morphological possibilities" may be estimated only by what does appear.

The effects of isolation and of self- and cross-fertilization are held to be problematical.

The greater part of the lecture is naturally devoted to the mutation cultures of DE VRIES and himself. Besides *Oenothera Lamarckiana*, the following three species have been shown to be in a state of mutation: *O. grandiflora*, *O. biennis*, and *O. cruciata*. "Parallel mutations" are exemplified by two observed origins of *nanella*-forms, i. e., forms with linear petals. A consideration of the mutating and mutant species leads to the conclusion that plants are made up of complex groups of unit characters, that some of these characters may exist for an indefinite time in a latent state, that a new character that departs widely from the parental condition is more variable than the homologous character of the parent species, and that at the same time it is less closely correlated.

<sup>12</sup> MACDOUGAL, D. T., Heredity and the origin of species. Lecture given before the Barnard Botanical Club, Columbia University, December 18, 1905. The Monist, Jan. 1906. 32 pages. Printed and distributed in advance.

The author substitutes for a *period* of mutation the conception of a nearly constant *frequency* of mutation. Thus, one plant in twenty of *O. Lamarckiana* is a mutant, but only one in two hundred of *O. biennis*. In others there may be one in ten thousand or one in a million.

Doubtless the most important fact presented is the result of investigations to determine the cause or causes of mutation. The introduction of strong osmotic and weak chemical solutions into the ovaries of *Raimannia odorata* shortly before fertilization, appears to have produced a large number of individuals of a hitherto unknown type. These new plants have a shorter life-cycle than that of the parent and are profoundly different in many characters. They have already bloomed and fruited, and obviously constitute a potential species. If this new species holds its characters in succeeding generations, this discovery will be one of far-reaching importance, as the first real clue to the causes which may effect mutative changes in plants.—GEORGE H. SHULL.

**Graft-hybrids.**—NOLL has made a careful morphological, anatomical, and cytological examination of the supposed graft-hybrids between *Crataegus monogyna* (stock) and *Mespilus germanica* (scion) in the Dardar Garden at Bronvaux near Metz, Germany.<sup>13</sup> Three branches, starting from the callus where stock and scion meet, present unmistakable evidence of their hybrid origin, each branch showing a different combination of the parental characters.

A consideration as to the possibility of graft-hybrids, in the light of present knowledge of the behavior of the hereditary substance, leads to the conclusion that they must originate through nuclear fusions in the callus or not at all; and moreover, that the studies of NĚMEC upon asexual nuclear fusions gives a basis of observed fact which warrants the affirmation that graft-hybrids are possible.

The cytological examination of the several hybrid branches showed that their cells do not possess double the normal sporophyte number of chromosomes; therefore, if these hybrids originated from the fusion of two vegetative cells, this process must have been followed by some method of chromosome reduction. This presents no insurmountable difficulty, since NĚMEC found that after 78 hours no nuclei were found which had more than the normal number of chromosomes, though many such were observed soon after fusion.

The greater resemblance of one of the hybrids to *Mespilus*, and of the other two to *Crataegus*, and the change of one of the latter from nearly typical *Crataegus* to near one of the other hybrid forms, are explained by assuming that in each fusion one nucleus remained in its accustomed cytoplasmic surroundings, and that the other nucleus, moving into unaccustomed surroundings, was so weakened or injured that, when the degeneration took place which reduced the chromosomes to their normal number, the weakened or injured chromosomes contributed the fewest determinants to the hybrid nucleus, thus giving the hybrid

<sup>13</sup> NOLL, T., Die Pfropf-Bastarde von Bronvaux. Sitzungsber. Niederrhein. Ges. f. Natur- u. Heilkunde Bonn, 1905. Separate, 34 pp.